

Configuration A2

L-MIMO-SC

Maximum Output Power 20.5dBm per port

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies	RBW (MHz)	Limit (dBm/MHz)
Channel Position B 5725.0MHz	20 MHz	5745.0MHz	1	See Note 2
Channel Position T 5850.0 MHz	20 MHz	5825.0MHz	1	See Note 2

Note 1: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be available to the end user.

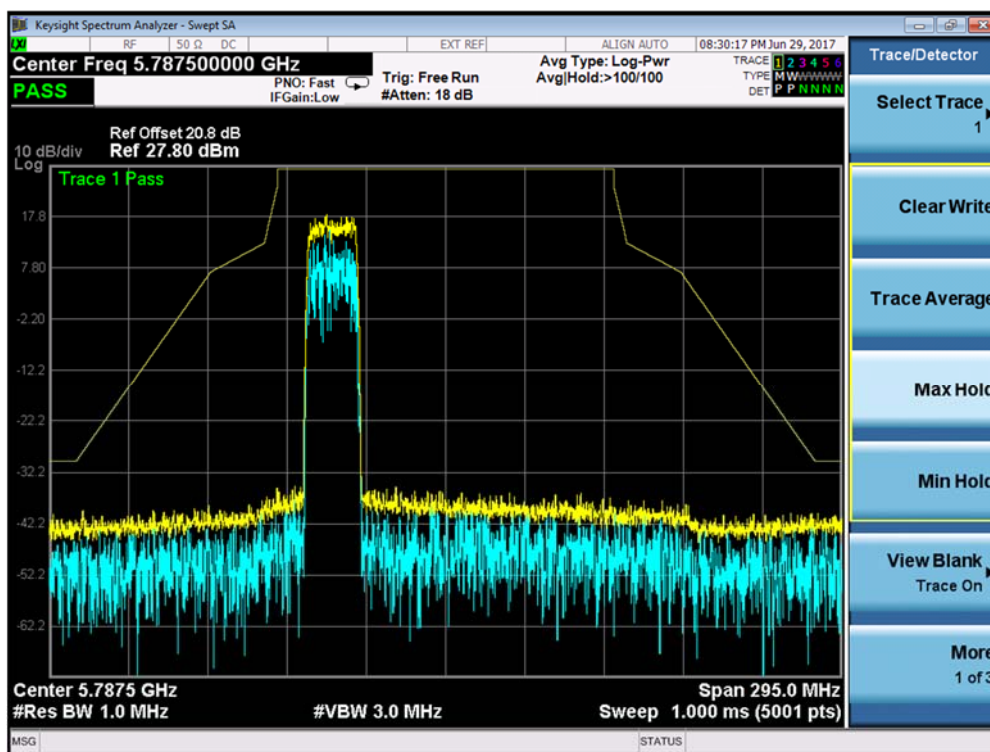
Note 2: For MIMO mode configurations, the limit was adjusted with a correction of -3.01dB [10Log(2)] to the following limit:

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

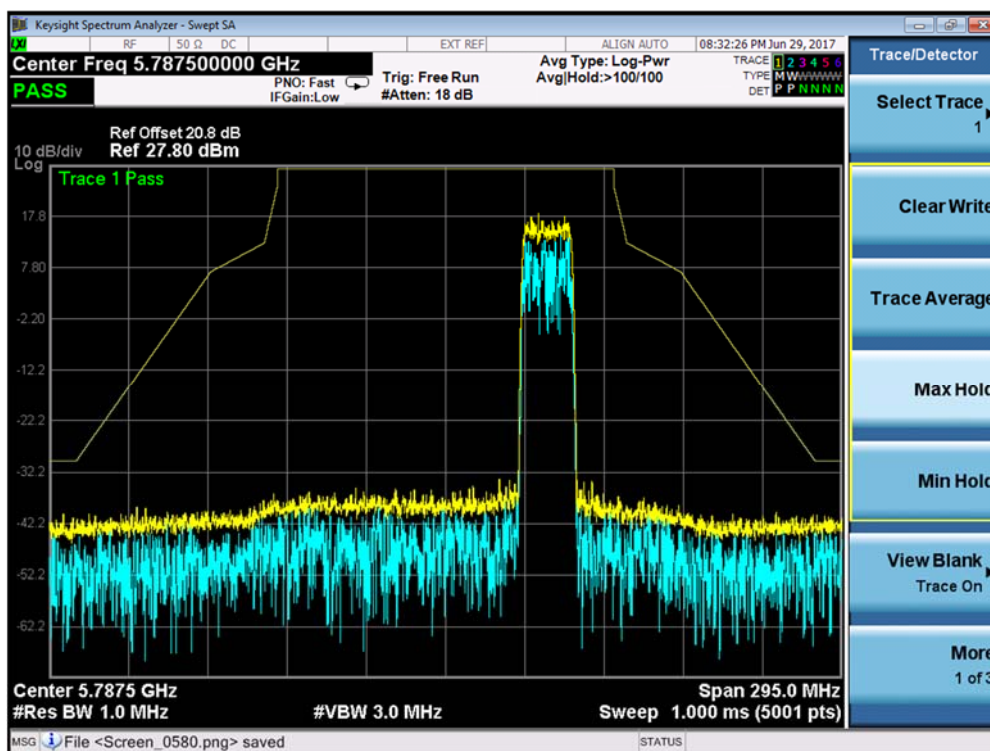


Product Service

Channel Position B – QPSK



Channel Position T – QPSK



L-MIMO-MC 1 (2C)

Maximum Output Power 20.5dBm per port

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies	RBW (MHz)	Limit (dBm)
Channel Position B 5725.0MHz	20 MHz	5745.0MHz + 5785.0MHz	1	See Note 2
Channel Position T 5850.0 MHz	20 MHz	5785.0MHz + 5825.0MHz	1	See Note 2

Note 1: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be available to the end user.

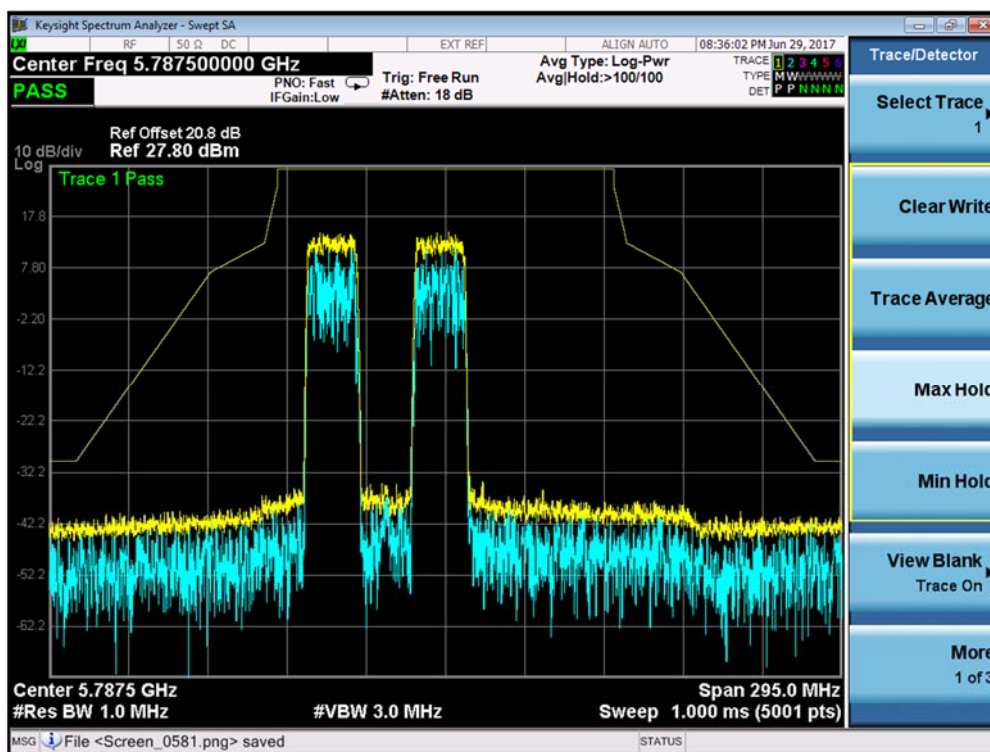
Note 2: For MIMO mode configurations, the limit was adjusted with a correction of -3.01dB [10Log(2)] to the following limit:

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

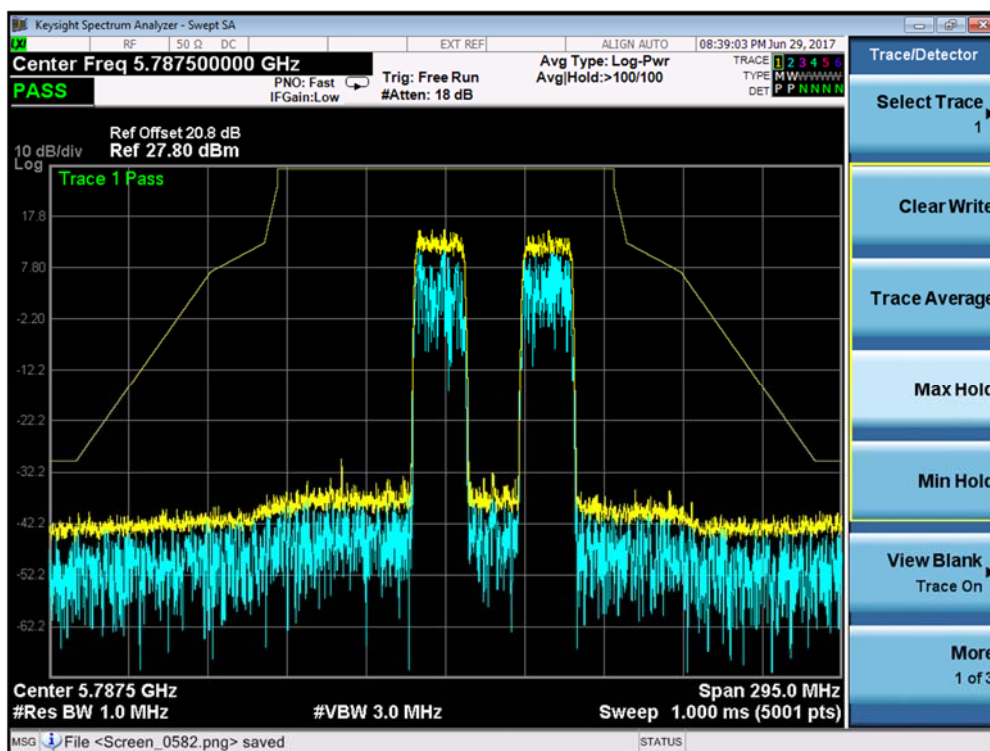


Product Service

Channel Position B_{RFBW} – QPSK



Channel Position T_{RFBW} – QPSK



Configuration B1

L-MIMO-SC

Maximum Output Power 25.0dBm per port

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies	RBW (MHz)	E.I.R.P Limit (dBm/MHz)
Channel Position B 5155.8 MHz	20 MHz	5180.0MHz	1	-30.00
Channel Position T 5250.0 MHz	20 MHz	5240.0MHz	1	-30.00

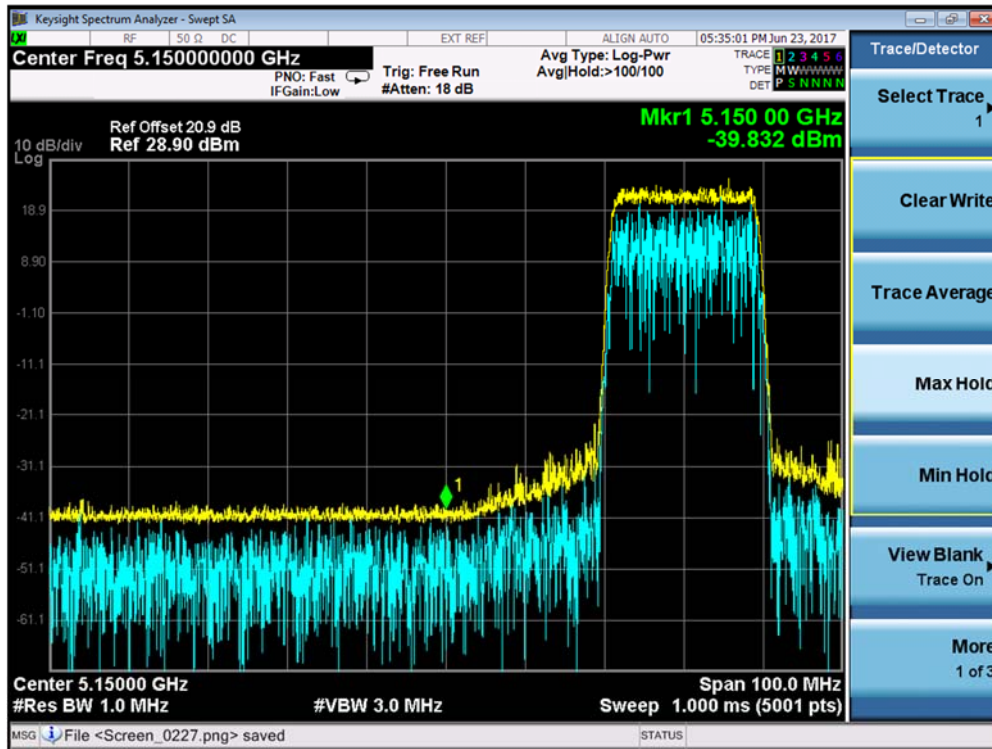
Note 1: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be available to the end user.

Note 2: 5150 MHz in the restricted band, use the following formula as per Section G (1) of 789033 D02 General UNII Test Procedures v01r04:

$$E \text{ (dB}\mu\text{V/m)} = E.I.R.P. \text{ (dBm)} + 95.2 = (\text{measured level dBm} + 6.0 \text{ dBi antenna gain}) + 95.2$$

Note 3: For MIMO mode configurations, the limit was adjusted with a correction of -3.01dB [10Log(2)] to limits -27 dBm (Clause 15.407), and peak limits 74 dB μ V/m and average limit 54 dB μ V/m (Clause 15.209).

Channel Position B - QPSK - Peak



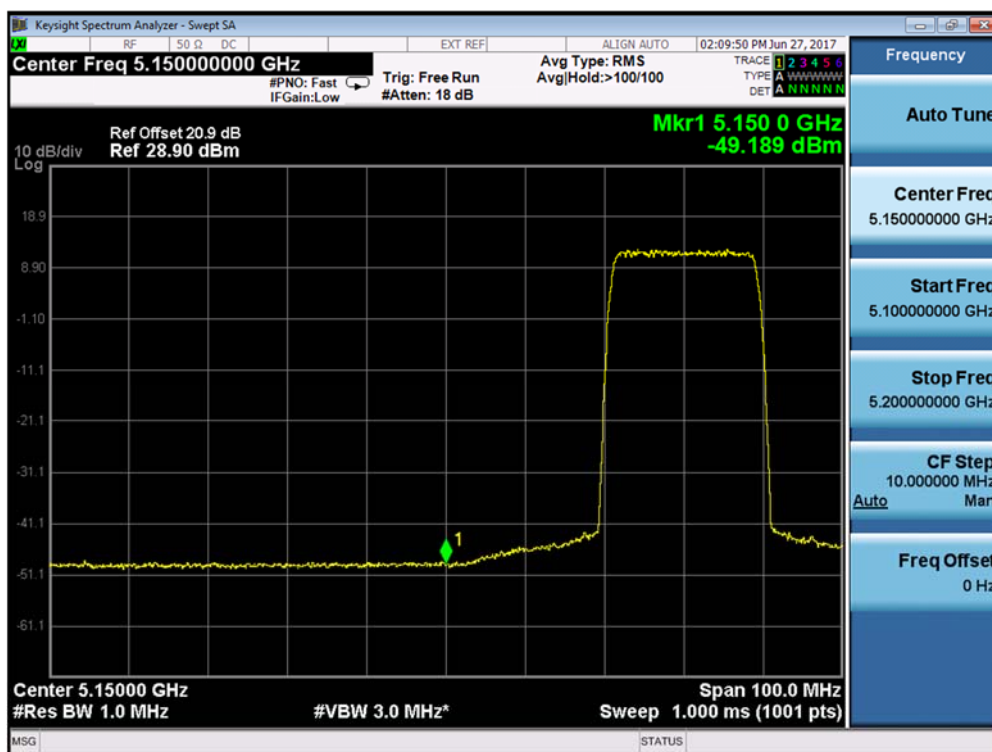
E.I.R.P. (dBm) = -39.832 + 6.0 = -33.832 dBm (Complies with the -30dBm limit)

E (dBμV/m) = E.I.R.P. (dBm) + 95.2 = -33.832 + 95.2 = 61.368 dBμV/m (Complies with the adjusted peak limit 71 dBμV/m)

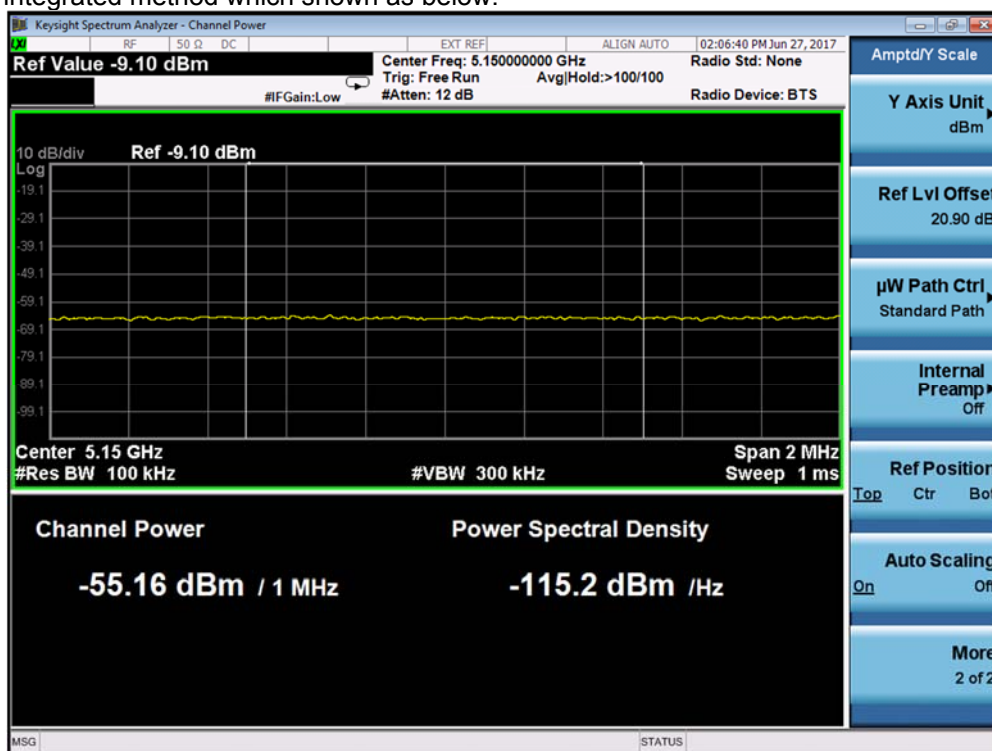


Product Service

Channel Position B - QPSK - Average

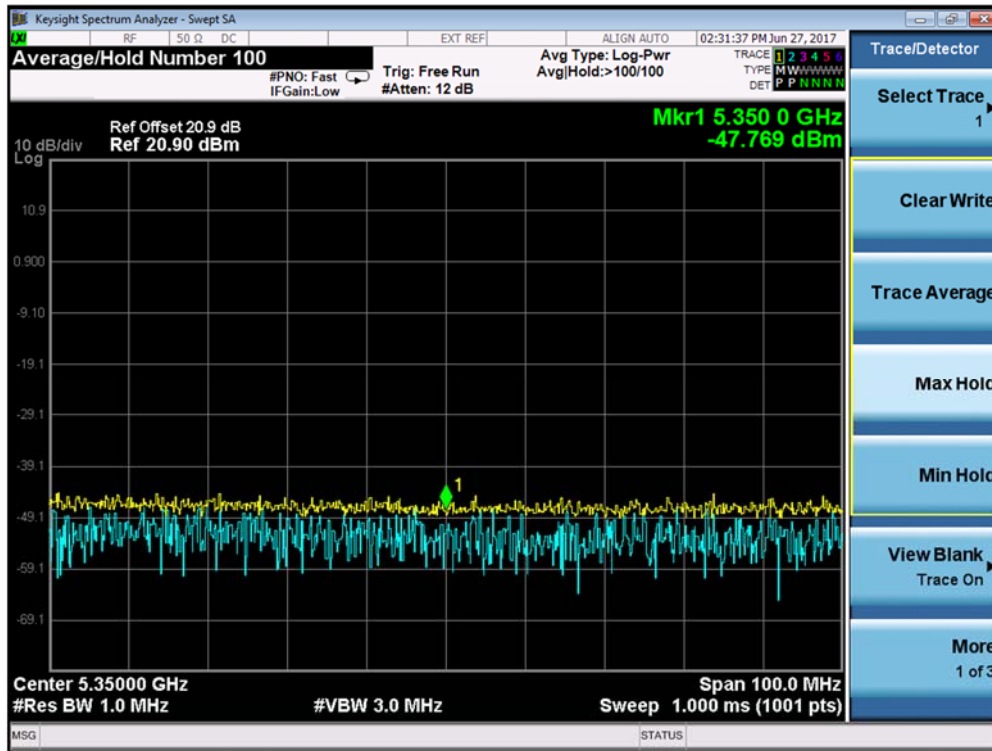


$E \text{ (dB}\mu\text{V/m)} = E.I.R.P. \text{ (dBm)} + 95.2 = (-49.189 + 6.0) + 95.2 = 52.011 \text{ dB}\mu\text{V/m}$, the results of EIRP exceed limit because of high noise floor. Therefore, the bandedge was verified by using integrated method which shown as below.



The band edge results for 5150.0 MHz by using integration method was -55.16dBm
 $E \text{ (dB}\mu\text{V/m)} = E.I.R.P. \text{ (dBm)} + 95.2 = (-55.16 + 6.0) + 95.2 = 46.04 \text{ dB}\mu\text{V/m}$
 (Complies with the adjusted average limit 51 dB $\mu\text{V/m}$)

Channel Position T - QPSK - Peak



E.I.R.P. (dBm) = -47.769 + 6.0 = -41.769 dBm (Complies with the -30dBm limit)

L-MIMO-MC 1 (2C)

Maximum Output Power 25.0dBm per port

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies	RBW (MHz)	E.I.R.P Limit (dBm/MHz)
Channel Position B 5155.8 MHz	20 MHz	5180.0MHz + 5220.0MHz	1	-30.00
Channel Position T 5250.0 MHz	20 MHz	5200.0MHz + 5240.0MHz	1	-30.00

Note 1: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be available to the end user.

Note 2: 5150 MHz in the restricted band, use the following formula as per Section G (1) of 789033 D02 General UNII Test Procedures v01r04:

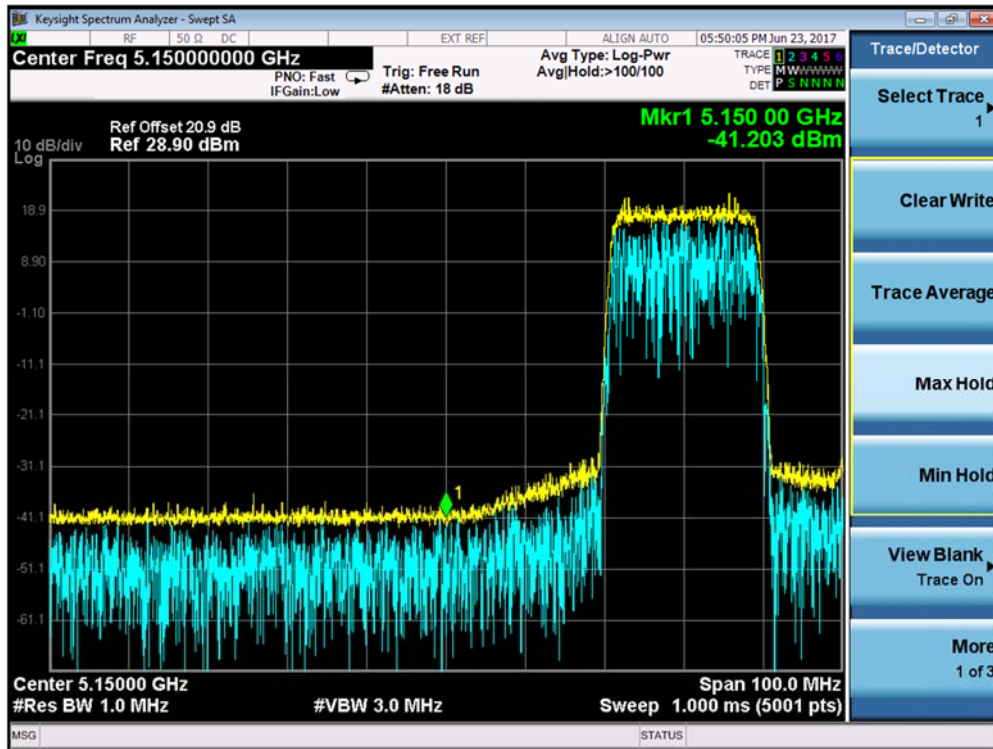
$$E \text{ (dB}\mu\text{V/m)} = E.I.R.P. \text{ (dBm)} + 95.2 = (\text{measured level dBm} + 6.0 \text{ dBi antenna gain}) + 95.2$$

Note 3: For MIMO mode configurations, the limit was adjusted with a correction of -3.01dB [10Log(2)] to limits -27 dBm (Clause 15.407), and peak limits 74 dB μ V/m and average limit 54 dB μ V/m (Clause 15.209).



Product Service

Channel Position B_{RFBW} - QPSK - Peak



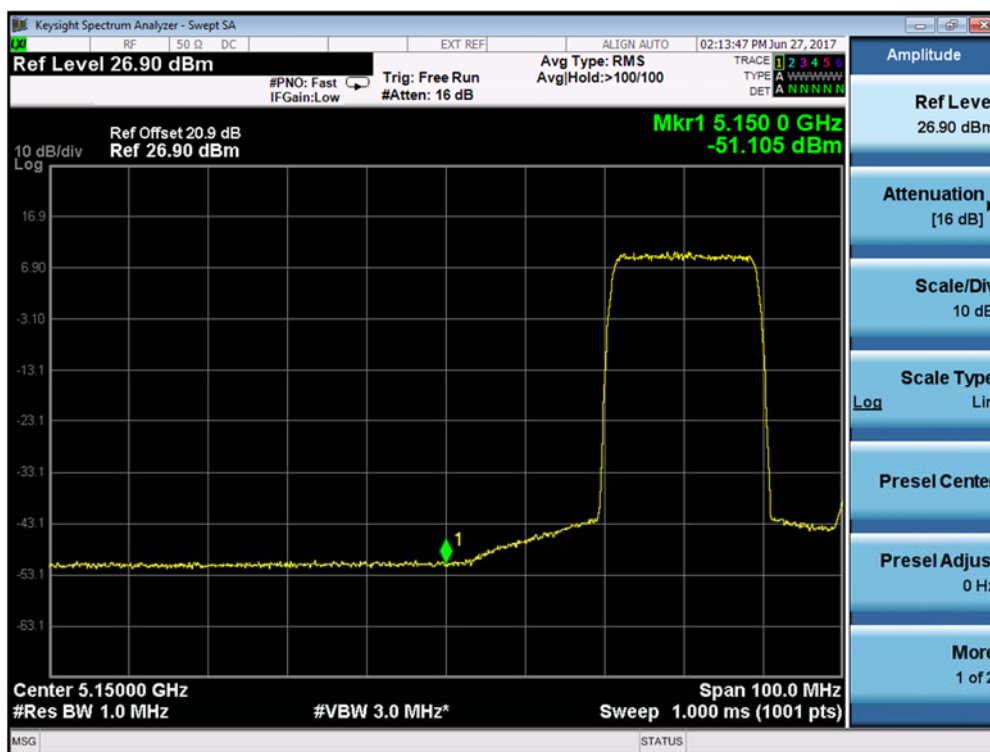
$E.I.R.P. (dBm) = -41.203 + 6.0 = -35.203 \text{ dBm}$ (Complies with the -30dBm limit)

$E (dB\mu V/m) = E.I.R.P. (dBm) + 95.2 = -35.20 + 95.2 = 59.997 \text{ dB}\mu V/m$ (Complies with the adjusted peak limit 71 dB $\mu V/m$)

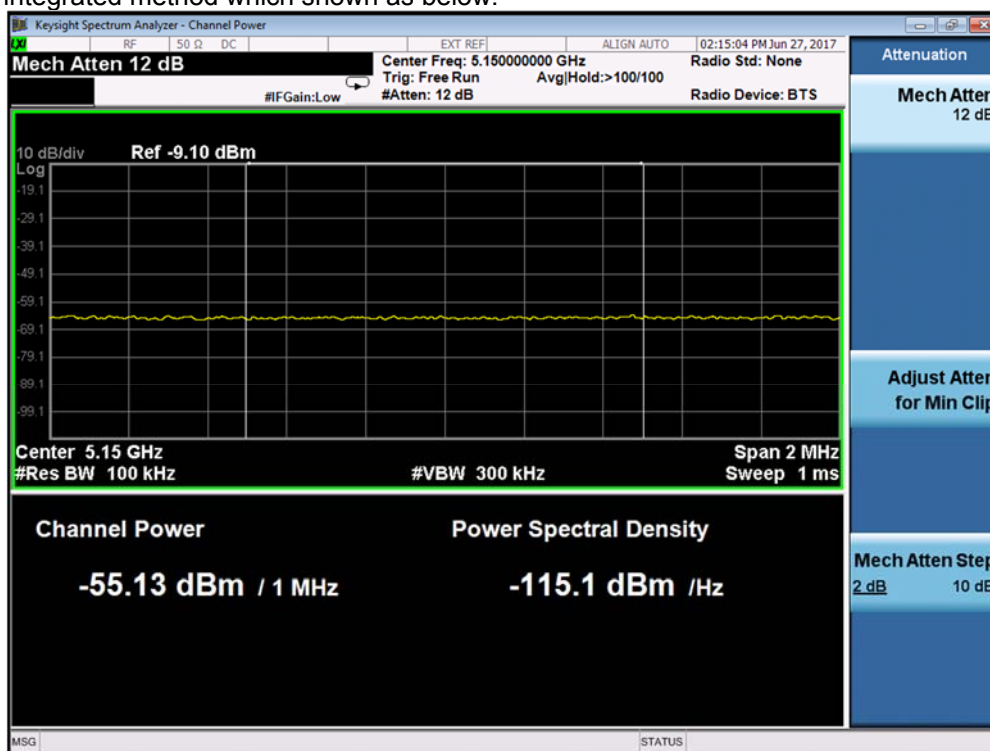


Product Service

Channel Position B_{RFBW} - QPSK - Average



$E \text{ (dB}\mu\text{V/m)} = E.I.R.P. \text{ (dBm)} + 95.2 = (-51.105 + 6.0) + 95.2 = 56.095 \text{ dB}\mu\text{V/m}$ the results of EIRP exceed limit because of high noise floor. Therefore, the bandedge was verified by using integrated method which shown as below.

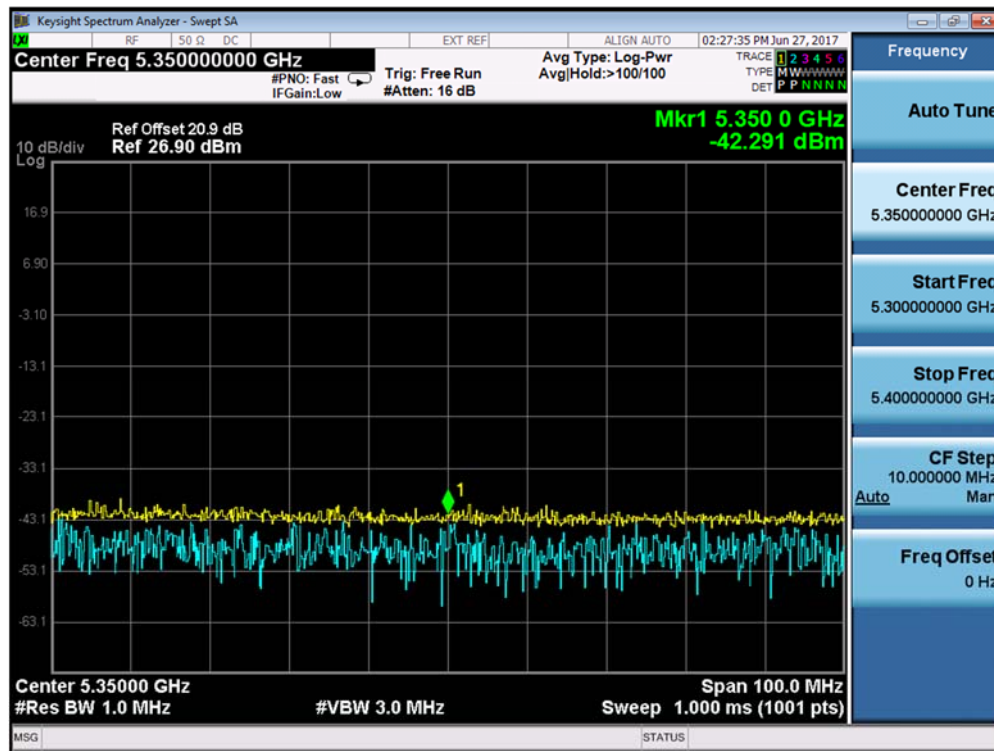


The band edge results for 5150.0 MHz by using integration method was -55.13dBm
 $E \text{ (dB}\mu\text{V/m)} = E.I.R.P. \text{ (dBm)} + 95.2 = (-55.13 + 6.0) + 95.2 = 46.07 \text{ dB}\mu\text{V/m}$
 (Complies with the adjusted peak limit 51 dB μ V/m)



Product Service

Channel Position T_{RFBW} - QPSK - Peak



E.I.R.P. (dBm) = $-42.291 + 6.0 = -36.291$ dBm (Complies with the -30.0dBm limit)



Product Service

Configuration B2

L-MIMO-SC

Maximum Output Power 25.0dBm per port

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies	RBW (MHz)	Limit (dBm)
Channel Position B 5725.0MHz	20 MHz	5745.0MHz	1	See Note 2
Channel Position T 5850.0 MHz	20 MHz	5825.0MHz	1	See Note 2

Note 1: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be available to the end user.

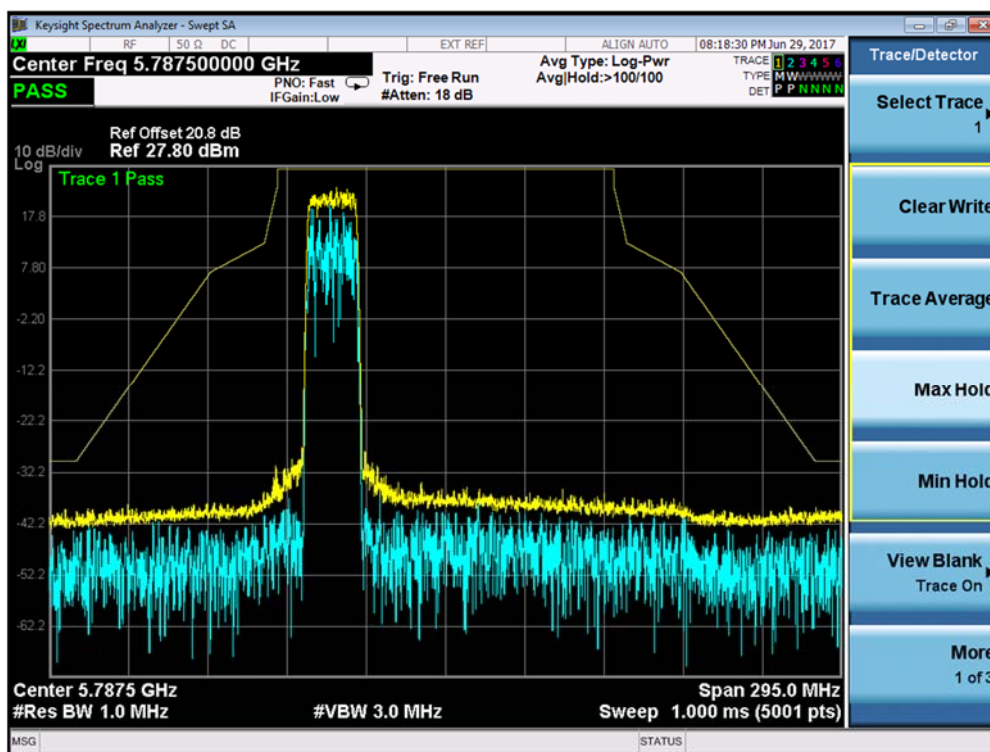
Note 2: For MIMO mode configurations, the limit was adjusted with a correction of -3.01dB [10Log(2)] to the following limit:

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

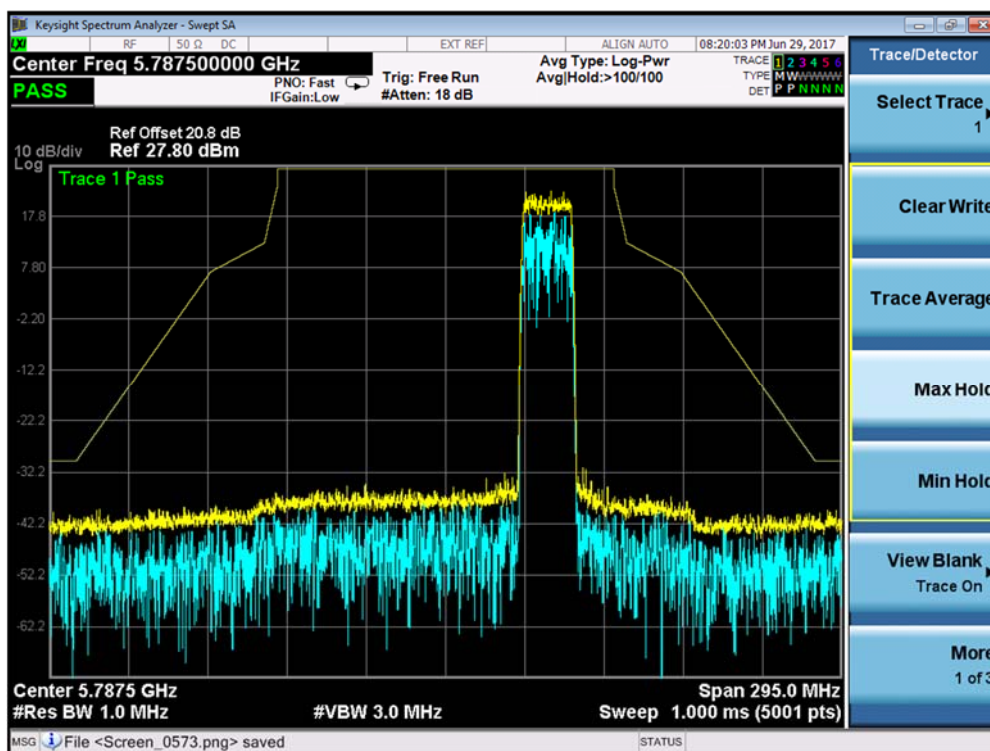


Product Service

Channel Position B – QPSK



Channel Position T – QPSK





Product Service

L-MIMO-MC 1 (2C)

Maximum Output Power 25.0dBm per port

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies	RBW (MHz)	Limit (dBm)
Channel Position B 5725.0MHz	20 MHz	5745.0MHz + 5785.0MHz	1	See Note 2
Channel Position T 5850.0 MHz	20 MHz	5785.0MHz + 5825.0MHz	1	See Note 2

Note 1: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be available to the end user.

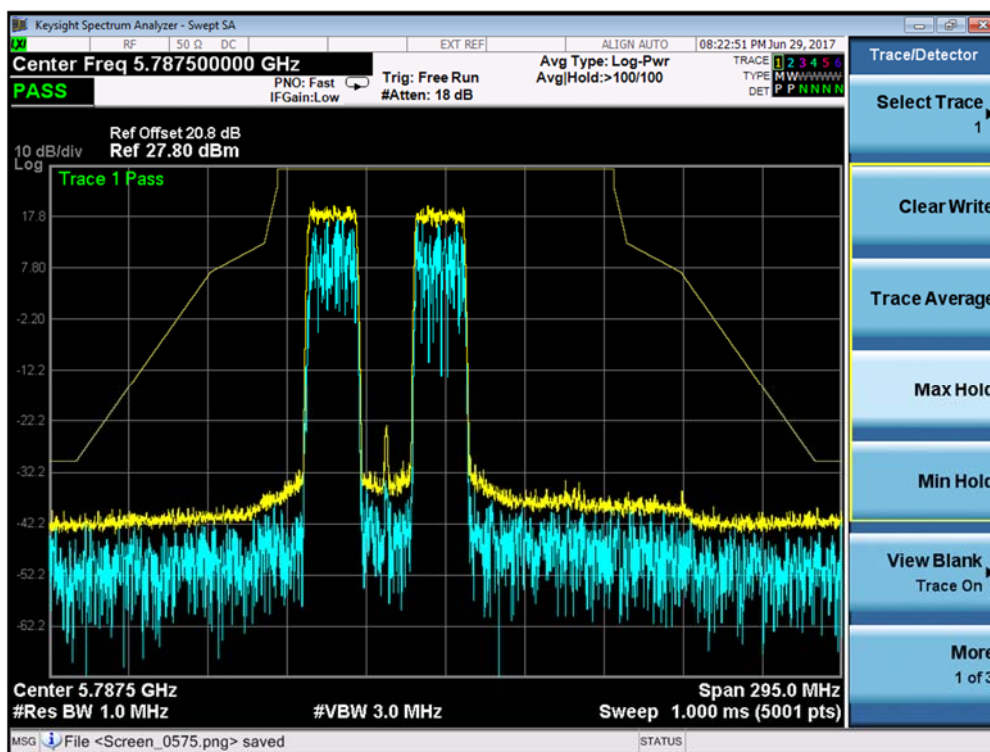
Note 2: For MIMO mode configurations, the limit was adjusted with a correction of -3.01dB [10Log(2)] to the following limit:

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

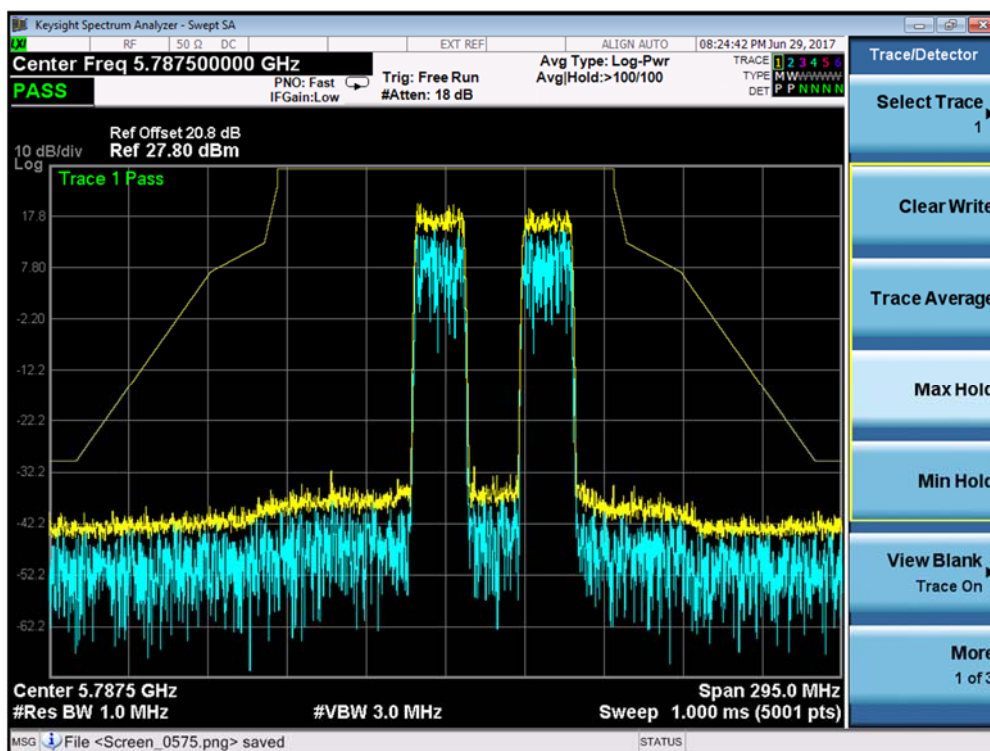


Product Service

Channel Position B_{RFBW} – QPSK



Channel Position T_{RFBW} – QPSK





Product Service

Limit	For transmitters operating in the 5.15–5.25 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Remarks

All the unwanted emissions of EUT does not exceed the limitations at the band edge.



Product Service

2.6 UNDESIRABLE EMISSION – RADIATED

2.6.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1053
FCC CFR 47 Part 15, Clause 15.407 (b)
FCC CFR 47 Part 15, Clause 15.205
FCC CFR 47 Part 15, Clause 15.209

2.6.2 Equipment Under Test

Radio 2205 B46, KRC 161 609/1, S/N: D825796609

2.6.3 Date of Test and Modification State

16, 17 and 18 June 2017 - Modification State 0

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 4.1.

2.6.5 Environmental Conditions

Ambient Temperature	21.5 - 22.1°C
Relative Humidity	22.0 - 39.0%

2.6.6 Test Method

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15, clause 15.407 (b), clause 15.205, clause 15.209 and ANSI/TIA-603-D:2010.

In accordance with FCC CFR 47 Part 15, Clause 15.407 (b), the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15–5.25 GHz band: All emissions outside of the 5.15 - 5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725–5.85 GHz band:

(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the chamber. Measurements of emissions from the EUT were obtained with the measurement antenna in both horizontal and vertical polarisations.

Emissions identified within the range 30MHz to 1GHz were then formally measured using quasi-peak detector, and 1GHz to 40GHz using both peak and average detector.

The limits for outside frequency band(s) of operation the power of the undesirable emissions above 1 GHz have been calculated, as shown below using the following formula:

$$E(\text{dB}\mu\text{V/m}) = \text{E.I.R.P} + 95.2 \text{ dB} = -27 + 95.2 = 68.2 \text{ dB}\mu\text{V/m}$$

The EUT was measured with the antenna height varied between 1 and 4 m with the turntable rotated between 0 and 360 degrees. The emission of any outside a licensee's frequencies within 20dB of the limit were measured with the substitution method used according to the standard.

The measurements were performed at a 3m distance unless otherwise stated.

These limits have been used to determine Pass or Fail for the harmonics measured and detailed in the following results.

The results are shown in the plots below.



Product Service

2.6.7 Test Results

Note: EUT was set to Idle Mode with AC power supply and DC power supply and the results and plots is shown as below. Only the worst case results plots have been included as all of the emissions are greater than 20dB below the limit. A set of plots have been included to show the measurement system noise floor.

Configuration A1

L-MIMO-SC

Maximum Output Power 20.5dBm per port, LTE Bandwidth 20.0MHz

Channel Position	Channel Frequencies
Channel Position B	5180.0MHz
Channel Position M	5220.0MHz
Channel Position T	5240.0MHz

Channel Position B - QPSK

No emissions were detected within 20dB of the limit.

Channel Position M – QPSK

No emissions were detected within 20dB of the limit.

Channel Position T - QPSK

No emissions were detected within 20dB of the limit.

Configuration A2

L-MIMO-SC

Maximum Output Power 23.5dBm per port, LTE Bandwidth 20.0MHz

Channel Position	Channel Frequencies
Channel Position B	5745.0MHz
Channel Position M	5785.0MHz
Channel Position T	5825.0MHz

Channel Position B - QPSK

No emissions were detected within 20dB of the limit.

Channel Position M – QPSK

No emissions were detected within 20dB of the limit.

Channel Position T - QPSK

No emissions were detected within 20dB of the limit.

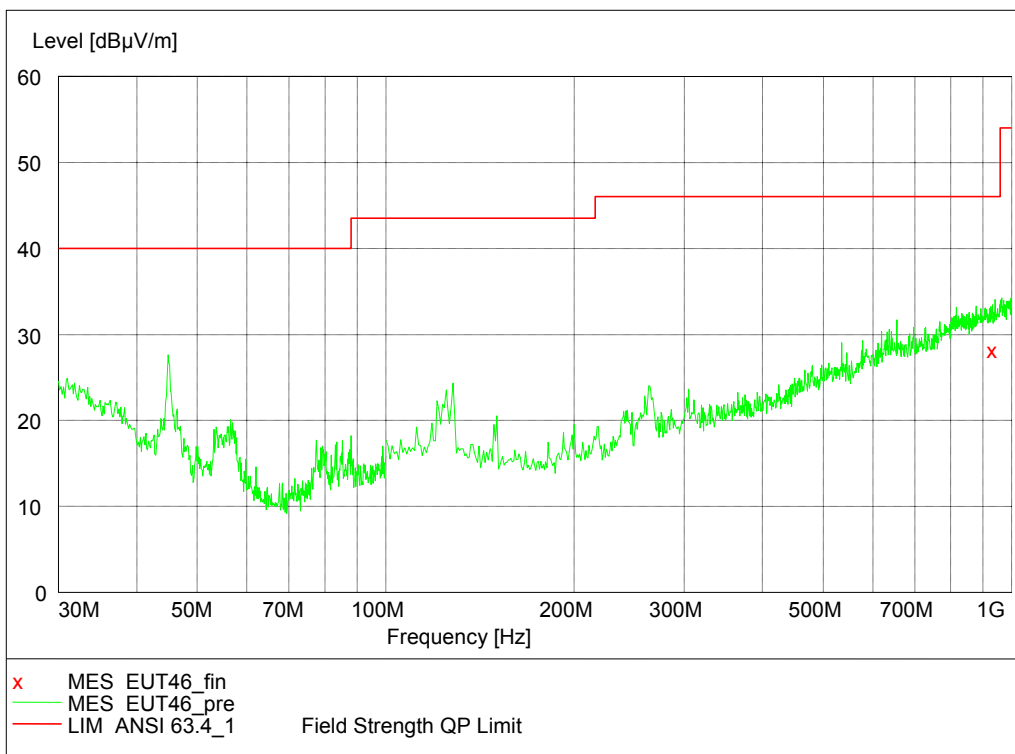
Configuration B1

L-MIMO-SC

Maximum Output Power 25.0 dBm per port, LTE Bandwidth 20.0MHz

Channel Position	Channel Frequencies
Channel Position B	5180.0MHz
Channel Position M	5220.0MHz
Channel Position T	5240.0MHz

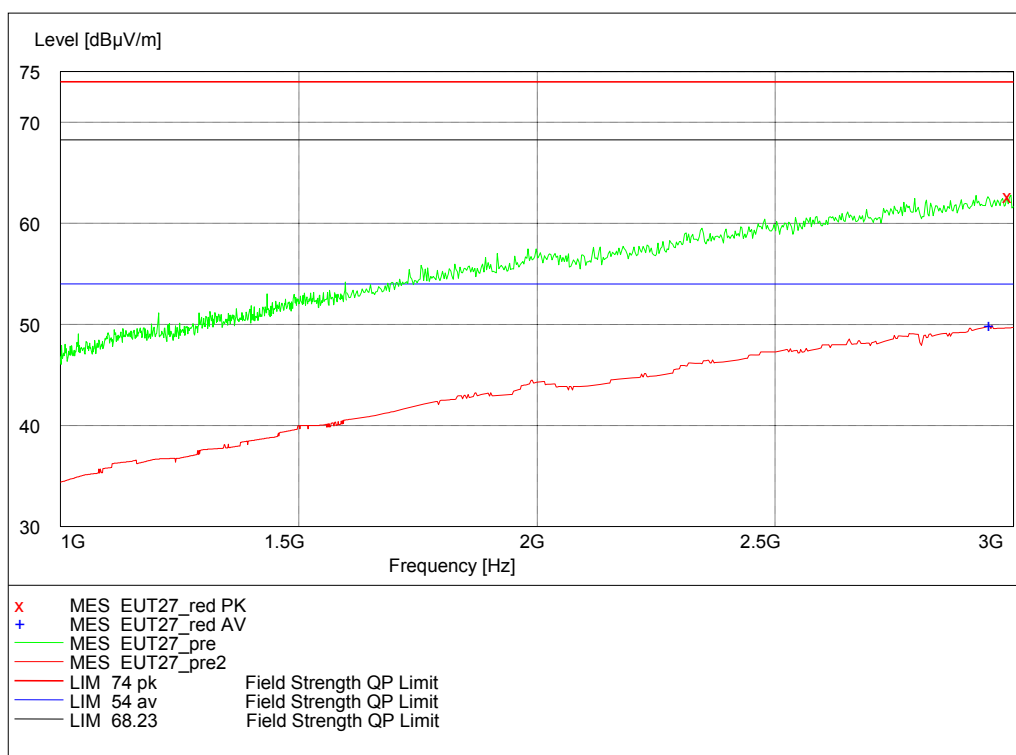
Channel Position B –LTE QPSK 20.0MHz - 30MHz - 1GHz



Quasi-Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
941.883768	28.30	28.2	36.0	17.7	100.0	180.00	VERTICAL

Channel Position B –LTE QPSK 20.0MHz - 1GHz - 3GHz



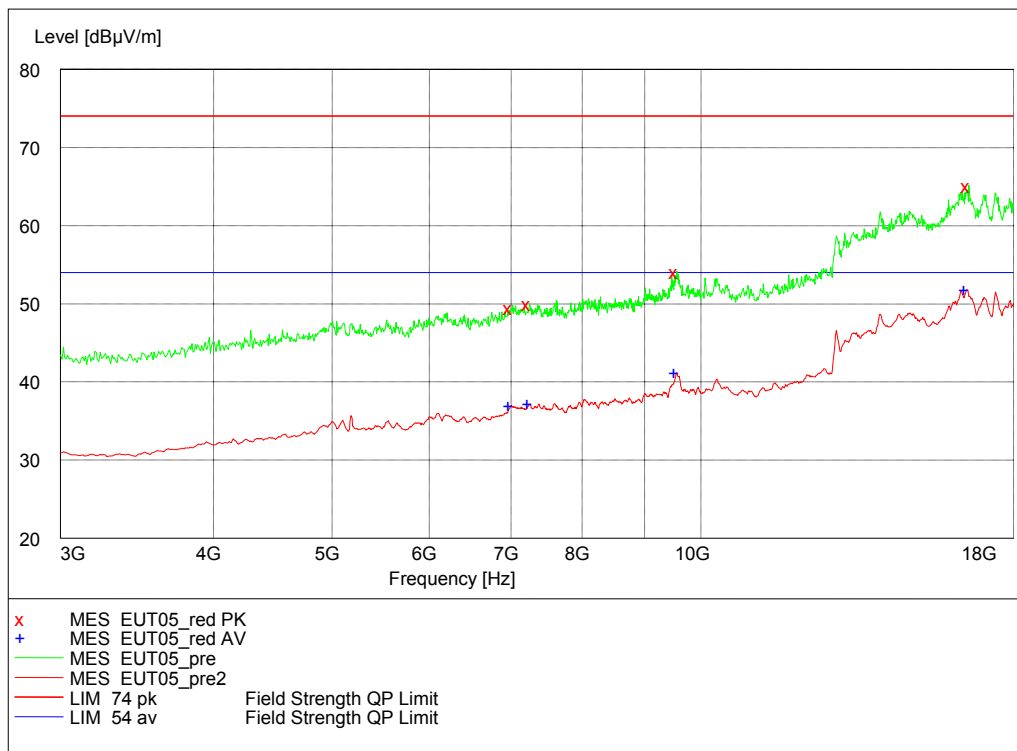
Average Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
2955.110220	49.86	43.9	54	4.1	100.0	0.0	VERTICAL

Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
2994.388778	62.77	44.0	74.0	11.2	100.0	90.0	VERTICAL

Channel Position B –LTE QPSK 20.0MHz - 3GHz - 18GHz



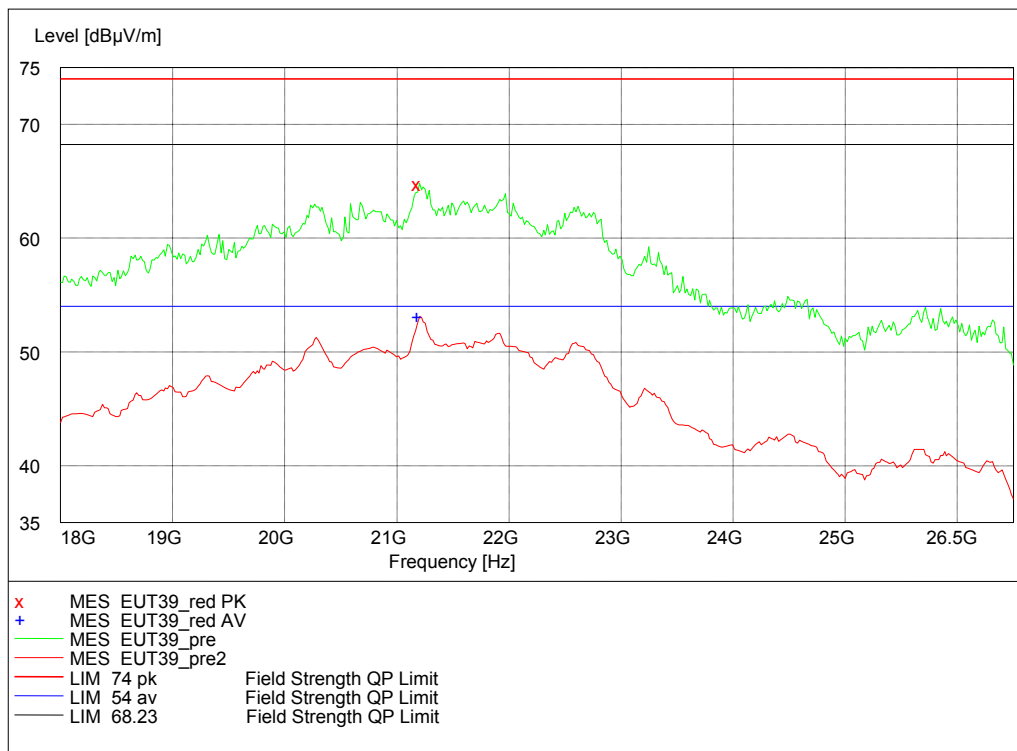
Average Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
7000.000000	36.98	9.2	54.0	17.0	200.0	0.0	VERTICAL
7252.505010	37.19	9.4	54.0	16.8	200.0	180.0	HORIZONTAL
9555.110220	41.15	14.3	54.0	12.8	100.0	180.0	VERTICAL
16492.985972	51.77	28.8	54.0	2.2	100.0	0.0	VERTICAL

Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
7000.000000	49.45	9.2	74.0	24.6	100.0	0.0	HORIZONTAL
7246.492986	50.04	9.4	74.0	24.0	100.0	0.0	HORIZONTAL
9555.110220	54.16	14.3	74.0	19.8	100.0	180.0	VERTICAL
16557.114228	65.18	28.1	74.0	8.8	100.0	180.0	HORIZONTAL

Channel Position B –LTE QPSK 20.0MHz - 18GHz - 26.5GHz



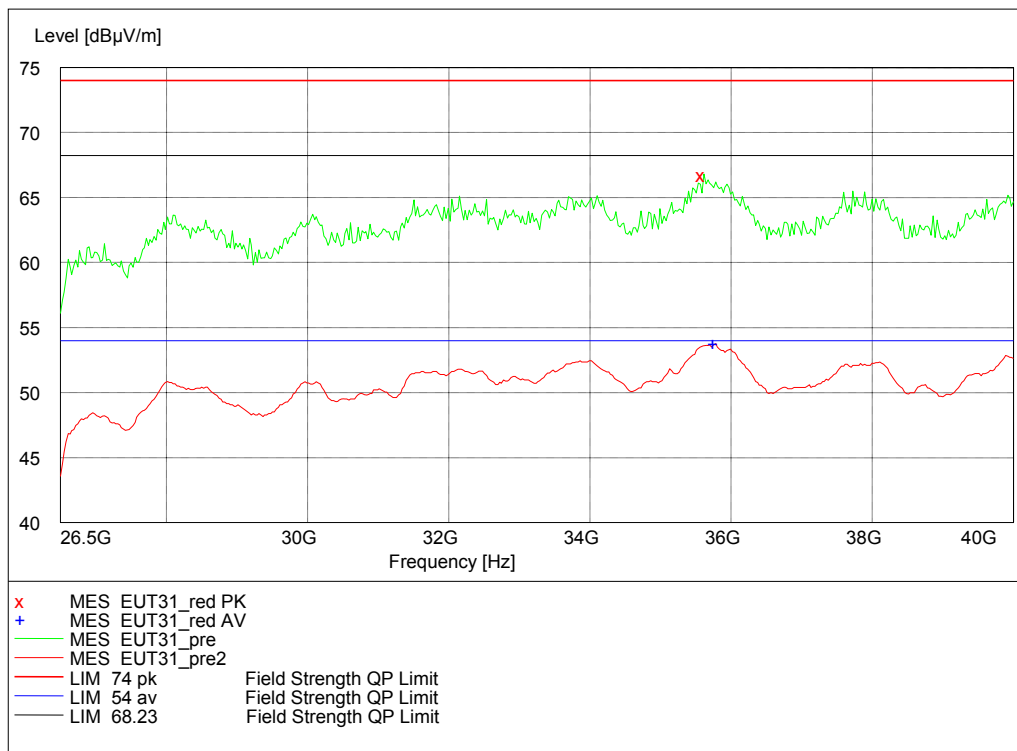
Average Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
21202.404810	53.11	33.4	54.0	0.9	100.0	0.0	VERTICAL

Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
21202.404810	64.81	33.4	74.0	9.2	100.0	270.0	VERTICAL

Channel Position B –LTE QPSK 20.0MHz - 26.5GHz - 40GHz



Average Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
35779.559118	53.75	19.6	54.0	0.3	100.0	0.00	VERTICAL

Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
35617.234469	66.80	19.6	74.0	7.2	100.0	180.0	VERTICAL

Channel Position M – QPSK/16QAM/64QAM/256QAM

No emissions were detected within 20dB of the limit.

Channel Position T - QPSK

No emissions were detected within 20dB of the limit.

Configuration L-MIMO-MC 1 (2C)

Maximum Output Power 20.5dBm per port, LTE Bandwidth 20.0MHz

Channel Position	Channel Frequencies
Channel Position B _{RFBW}	5180.0MHz + 5220.0MHz
Channel Position M _{RFBW}	5200.0MHz + 5240.0MHz

Channel Position B_{RFBW} - QPSK

No emissions were detected within 20dB of the limit.

Channel Position T_{RFBW} - QPSK

No emissions were detected within 20dB of the limit.

Configuration L-MIMO-MC 2 (3C)

Maximum Output Power 20.5dBm per port, LTE Bandwidth 20.0MHz

Channel Position	Channel Frequencies
Channel Position B _{RFBW}	5180.0MHz + 5200.0MHz + 5220.0MHz
Channel Position T _{RFBW}	5200.0MHz + 5220.0MHz + 5240.0MHz

Channel Position B_{RFBW} - QPSK

No emissions were detected within 20dB of the limit.

Channel Position T_{RFBW} - QPSK

No emissions were detected within 20dB of the limit.



Product Service

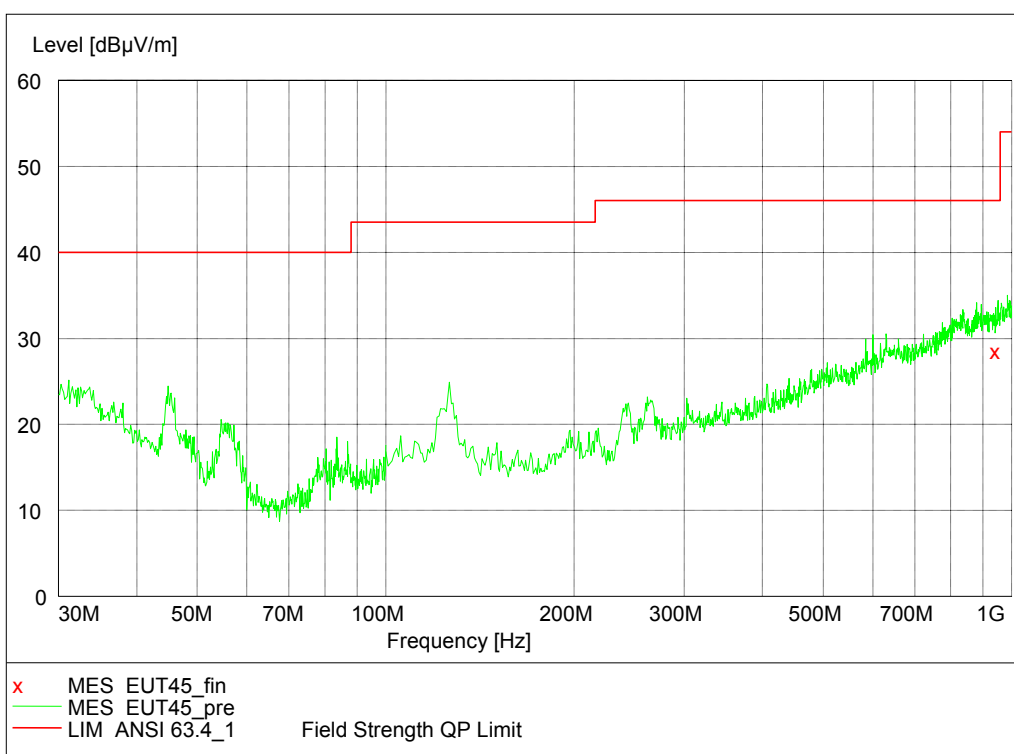
Configuration B2

L-MIMO-SC

Maximum Output Power 23.0dBm per port, LTE Bandwidth 20.0MHz

Channel Position	Channel Frequencies
Channel Position B	5745.0MHz
Channel Position M	5785.0MHz
Channel Position T	5825.0MHz

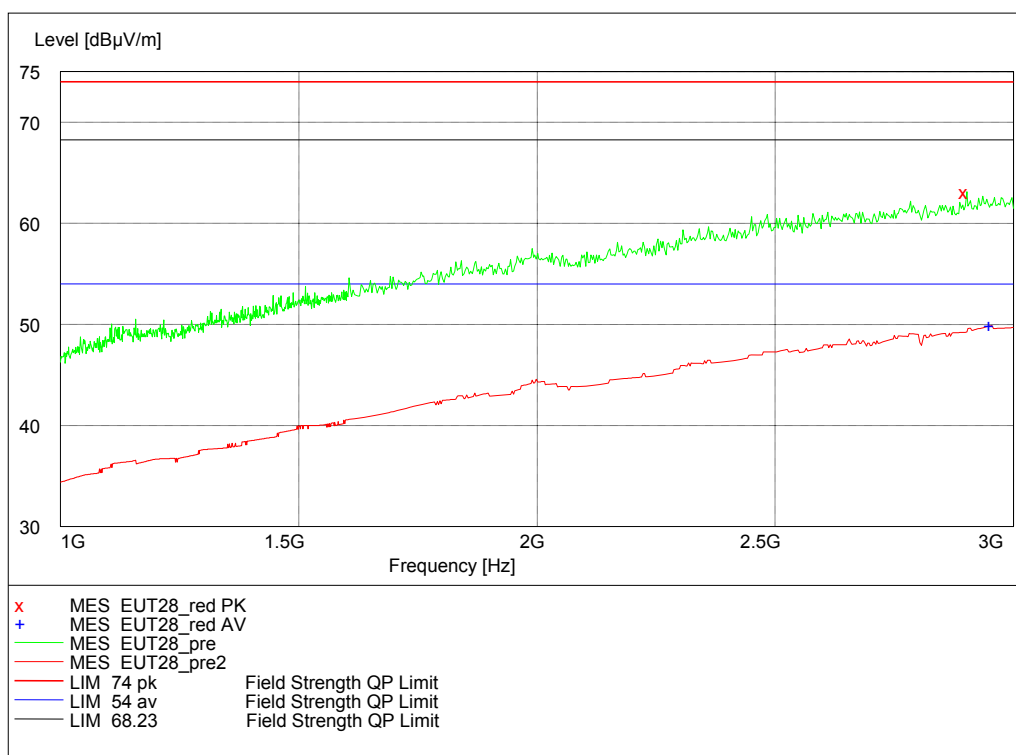
Channel Position B –LTE QPSK 20.0MHz - 30MHz - 1GHz



Quasi-Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
951.903808	28.60	28.5	46.0	17.4	100.0	180.0	VERTICAL

Channel Position B –LTE QPSK 20.0MHz - 1GHz - 3GHz



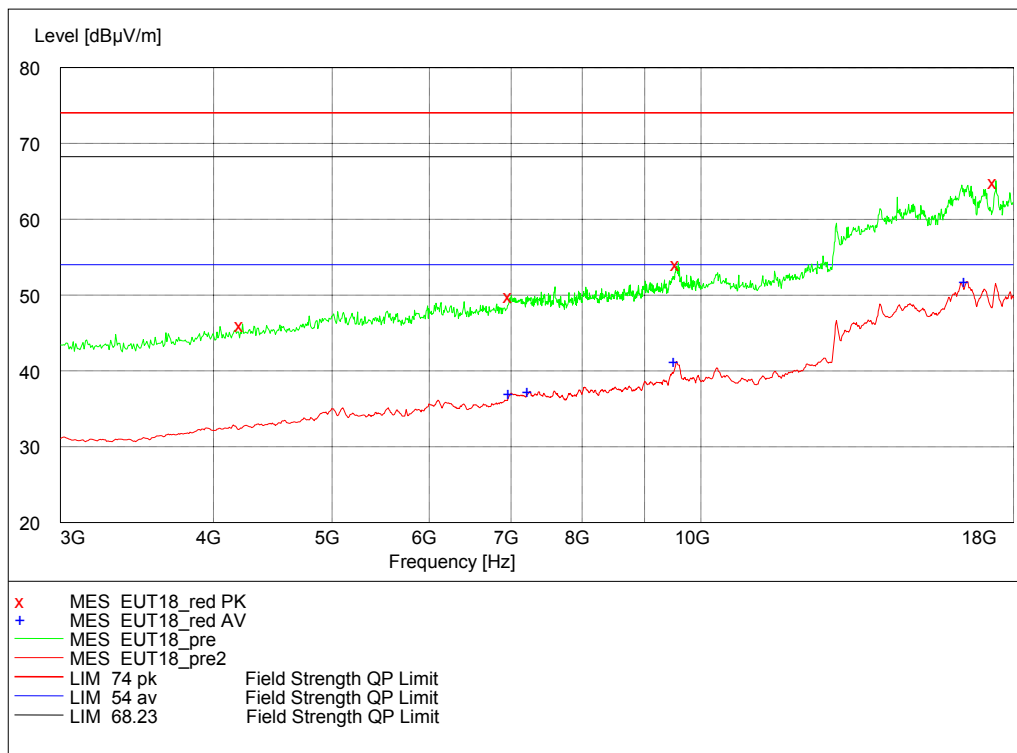
Average Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
2955.110220	49.86	43.9	54.0	4.1	200.0	270.0	VERTICAL

Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
2901.803607	63.10	43.3	74.0	10.9	200.0	90.0	VERTICAL

Channel Position B –LTE QPSK 20.0MHz - 3GHz - 18GHz



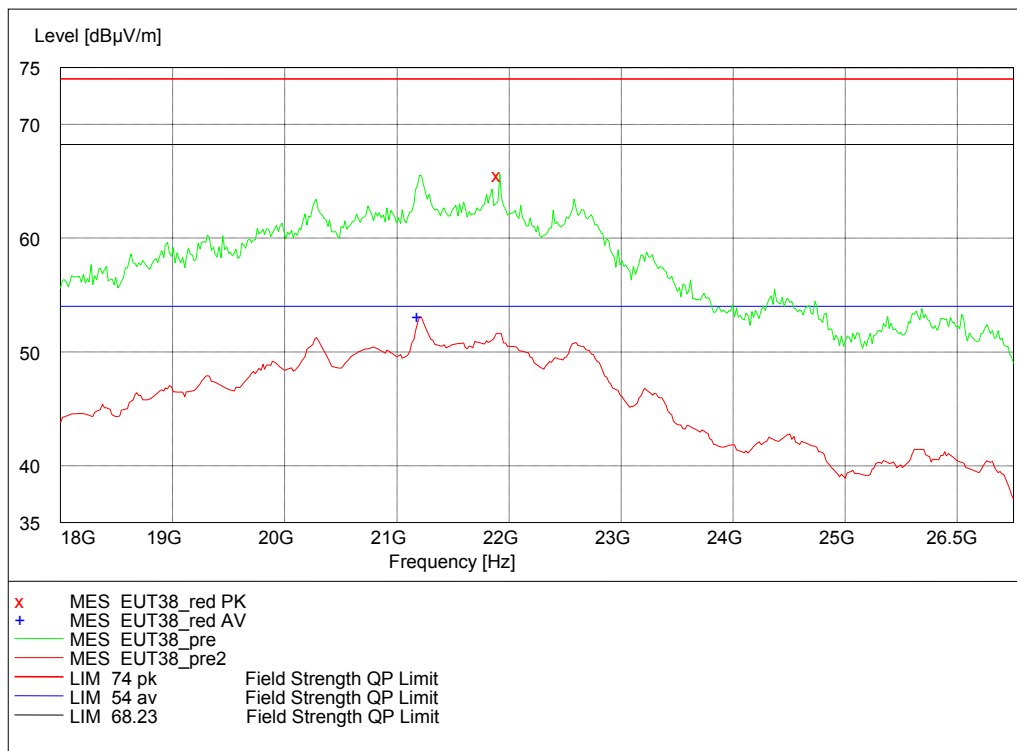
Average Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
7000.000000	37.05	9.2	54.0	17.0	200.0	0.0	HORIZONTAL
7252.505010	37.29	9.4	54.0	16.7	100.0	270.0	VERTICAL
9549.098196	41.24	14.3	54.0	12.8	100.0	0.0	VERTICAL
16492.985972	51.77	28.8	54.0	2.2	100.0	0.0	VERTICAL

Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
4226.452906	46.21	2.7	74.0	27.8	200.0	180.0	VERTICAL
7000.000000	49.95	9.2	74.0	24.0	200.0	0.0	HORIZONTAL
9591.182365	54.26	14.5	74.0	19.7	100.0	180.0	VERTICAL
17422.845691	65.08	29.5	74.0	8.9	200.0	270.0	VERTICAL

Channel Position B –LTE QPSK 20.0MHz - 18GHz - 26.5GHz



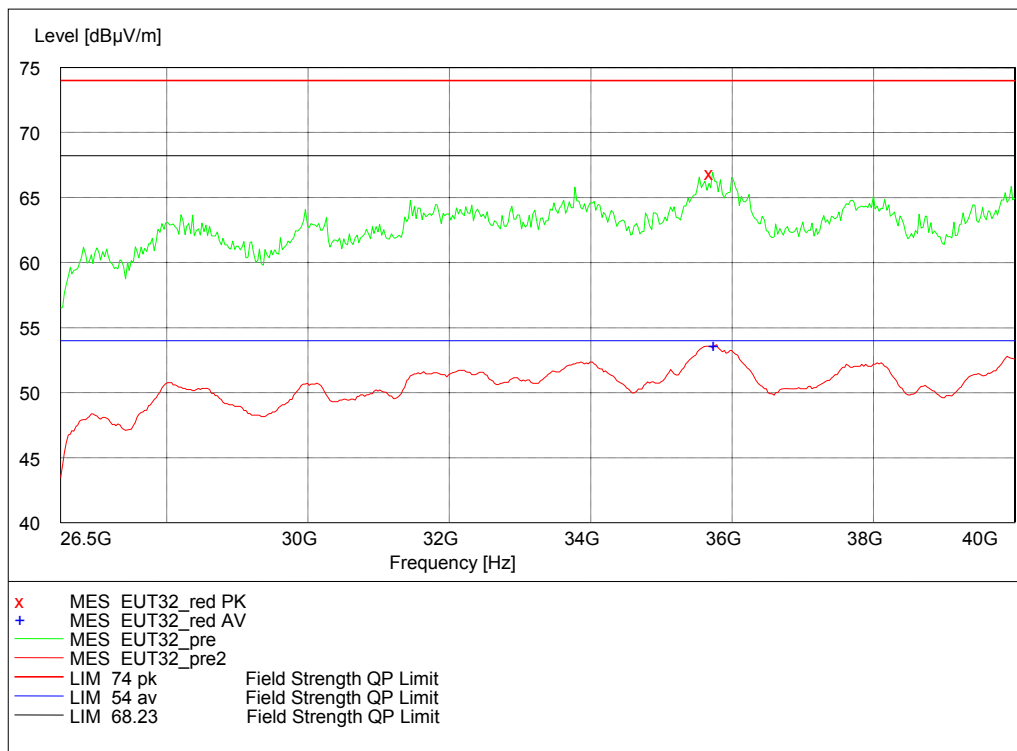
Average Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
21202.404810	53.11	33.4	54.0	0.9	100.0	0.0	VERTICAL

Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
21917.835671	65.64	29.5	74.0	8.4	100.0	180.0	VERTICAL

Channel Position B –LTE QPSK 20.0MHz - 26.5GHz - 40GHz



Average Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
35779.559118	53.68	19.6	54.0	0.3	200.0	270.0	HORIZONTAL

Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
35725.450902	66.93	19.6	74.0	7.1	200.0	0.0	HORIZONTAL



Product Service

Channel Position M – QPSK/16QAM/64QAM/256QAM

No emissions were detected within 20dB of the limit.

Channel Position T - QPSK

No emissions were detected within 20dB of the limit.

Configuration L-MIMO-MC 1 (2C)

Maximum Output Power 20.5dBm per port, LTE Bandwidth 20.0MHz

Channel Position	Channel Frequencies
Channel Position M _{RFBW}	5765.0MHz + 5805.0MHz

Configuration L-MIMO-MC 2 (3C)

Maximum Output Power 20.5dBm per port, LTE Bandwidth 20.0MHz

Channel Position	Channel Frequencies
Channel Position M _{RFBW}	5765.0MHz + 5785.0MHz + 5805.0MHz

Channel Position M_{RFBW} - QPSK

No emissions were detected within 20dB of the limit.

Limit

Frequency of emission (MHz)	Limit (dBμV)	
30 - 88	40.0	
88 - 216	43.5	
216 – 960	46.0	
Above 960	54.0 (Average)	68.2 or 74.0 (Peak)

Remarks

The Emission of EUT is sufficient to keep it within limit at the measured frequencies.



Product Service

2.7 FREQUENCY STABILITY

2.7.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 15, Clause 15.407(g)

2.7.2 Equipment Under Test

Radio 2205 B46, KRC 161 609/1, S/N: D825931354

2.7.3 Date of Test and Modification State

29 and 30 June 2017 - Modification State 0

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 4.1.

2.7.5 Environmental Conditions

Ambient Temperature	24.0 - 24.1°C
Relative Humidity	55.0 - 57.0%

2.7.6 Test Method

The test was applied in accordance with test method requirements of FCC CFR 47 Part 15, Clause 15.407(g).

Frequency Error – Temperature Variation

The EUT was tested over the temperature range -30°C to +50°C in 10°C steps with -48 V DC Power Supply. At each temperature step, the Base Station was configured to transmit an [RAT]* at maximum power on the middle channel of the operating band. After achieving thermal balance, the averages of 200 transmission bursts were measured and the result recorded.

Frequency Error – Voltage Variation

The EUT was tested at the supplied voltages varied from 85 to 115 percent of the nominal values of -48 VDC. At +20°C, the Base Station was configured to transmit an [RAT]* at maximum power on the bottom, middle and top channel of the operating band. The average of 200 transmission bursts was measured and the result recorded.

[RAT]*: LTE (20.0 MHz OBW) - Test Model E-TM1.1 Single Carrier with QPSK modulation

2.7.7 Test Results

Frequency Error – Temperature Variation

Configuration A1

L-MIMO-SC

Maximum Output Power 20.5 dBm per port, Channel Bandwidth 20.0 MHz

Supply Voltage DC (V)	Temperature	Frequency Stability (Hz)		
		Channel Position B (5180.0MHz)	Channel Position M (5220.0MHz)	Channel Position T (5240.0MHz)
-48.0	-30°C	12.65	17.89	18.76
	-20°C	14.54	13.44	13.29
	-10°C	12.40	11.52	10.81
	0°C	12.08	14.22	10.16
	+10°C	27.75	27.50	31.14
	+20°C	9.33	10.35	8.57
	+30°C	10.55	10.71	12.50
	+40°C	9.98	12.21	13.11
	+50°C	14.54	11.59	12.04

Configuration A2

Configuration L-MIMO-SC

Maximum Output Power 20.5dBm per port, Channel Bandwidth 20.0MHz

Supply Voltage DC (V)	Temperature	Frequency Stability (Hz)		
		Channel Position B (5745.0MHz)	Channel Position M (5785.0MHz)	Channel Position T (5825.0MHz)
-48.0	-30°C	16..94	17.34	17.52
	-20°C	14.80	14.90	19.09
	-10°C	13.50	12.19	10.69
	0°C	11.19	11.34	10.18
	+10°C	27.74	29.13	26.59
	+20°C	11.92	14.53	10.93
	+30°C	12.95	12.91	13.71
	+40°C	12.76	13.49	15.51
	+50°C	12.63	10.83	14.07



Product Service

Frequency Error – Voltage Variation

Configuration A1

L-MIMO-SC

Maximum Output Power 20.5dBm per port, Channel Bandwidth 20.0MHz

Supply Voltage DC (V)	Temperature	Frequency Stability (Hz)		
		Channel Position B (5180.0MHz)	Channel Position M (5220.0MHz)	Channel Position T (5240.0MHz)
-40.8	+20°C	11.89	12.71	10.15
-48.0		9.33	10.35	8.57
-55.2		10.40	8.59	9.78

Configuration A2

Configuration L-MIMO-SC

Maximum Output Power 20.5dBm per port, Channel Bandwidth 20.0MHz

Supply Voltage DC (V)	Temperature	Frequency Stability (Hz)		
		Channel Position B (5745.0MHz)	Channel Position M (5785.0MHz)	Channel Position T (5825.0MHz)
-40.8	+20°C	13.02	11.40	9.83
-48.0		11.92	14.53	10.93
-55.2		9.29	12.14	10.38

Limit	The frequency stability shall be sufficient to ensure that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.
-------	---

Remarks

The frequency stability of the EUT is sufficient to keep it within limit at any temperature and voltage interval across the measured range.



Product Service

2.8 CONDUCTED EMISSION

2.8.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.407(b)
FCC CFR 47 Part 15, Clause 15.207

2.8.2 Equipment Under Test

Radio 2205 B46, KRC 161 609/1, S/N: D825796609

2.8.3 Date of Test and Modification State

16, 17 and 18 Jun 2017 - Modification State 0

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 4.1.

2.8.5 Environmental Conditions

Ambient Temperature	22.9 - 23.0°C
Relative Humidity	43.0 - 44.0%

2.8.6 Test Method

The test was applied in accordance with FCC CFR 47 Part 15, Clause 15.407 (b), and the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in § 15.207.

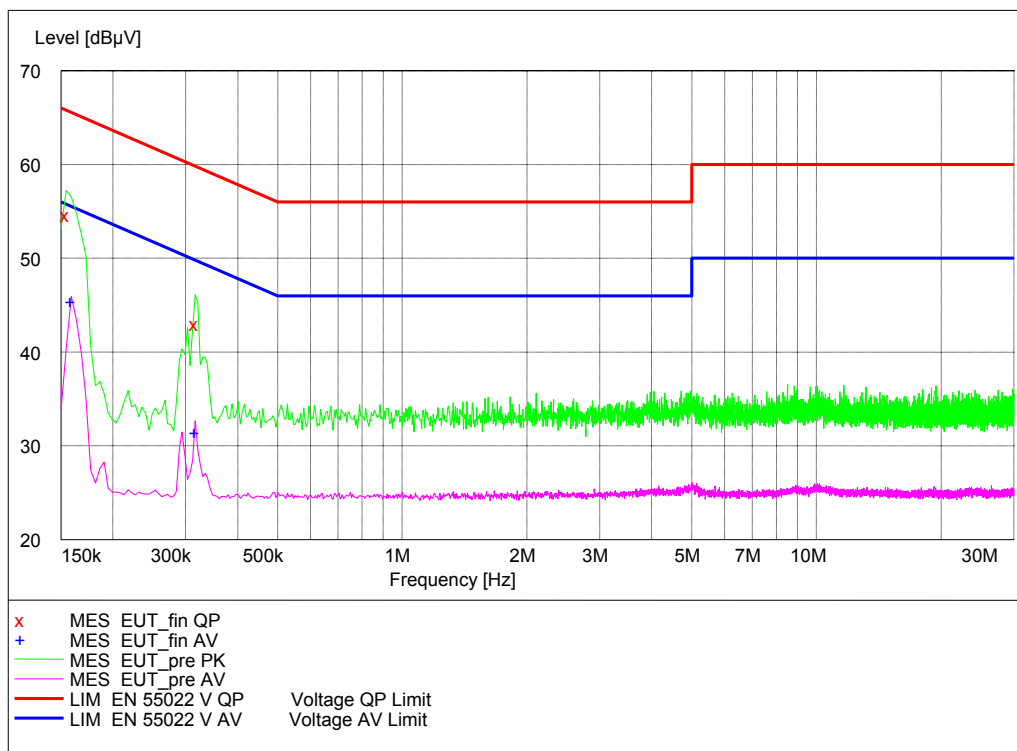
These limits have been used to determine Pass or Fail for the emission measured and detailed in the following results.

The results are shown in the plots below.

2.8.7 Test Results

Note: The EUT was set to Idle Mode and Transmit Mode with AC power supply and the worse results and plots is shown as below.

Transmit Mode- L Line



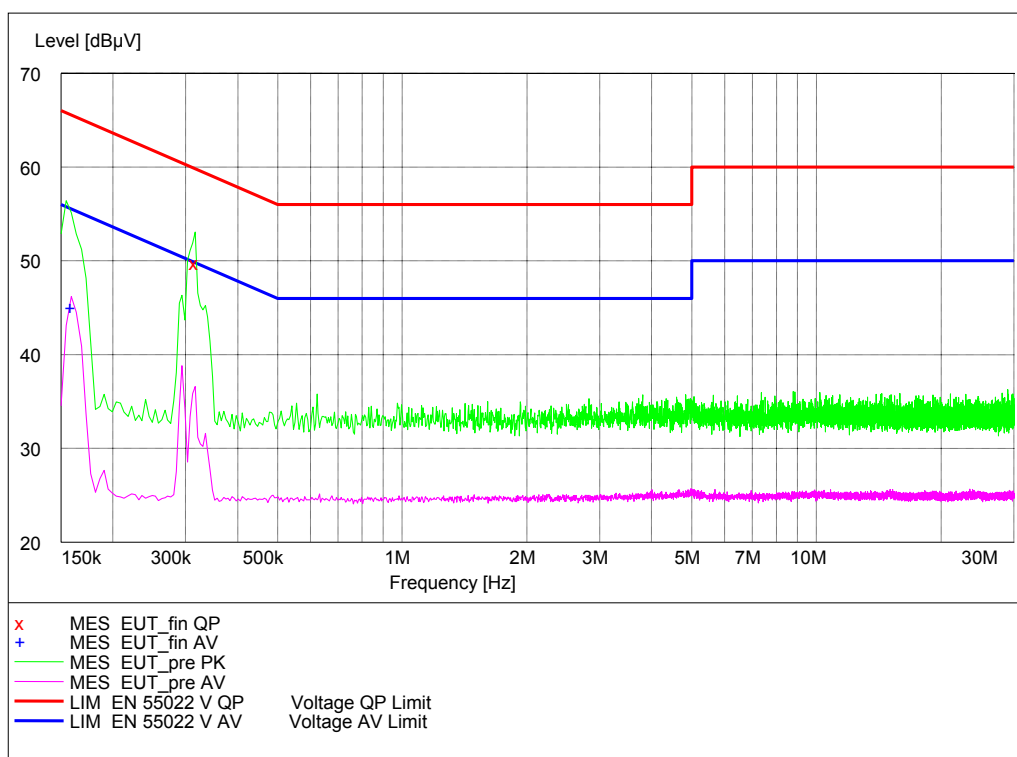
Average Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)
0.159000	40.40	29.5	56	10.1
0.316500	31.40	29.7	50	18.4

Quasi-Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)
0.154500	54.60	29.5	66	11.2
0.316500	43.10	29.7	60	16.7

Transmit Mode - N Line



Average Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)
0.159000	45.00	29.5	56	10.5

Quasi-Peak Data

Frequency (MHz)	Level (dBμV/m)	Transd (dBμV/m)	Limit (dBμV/m)	Margin (dB)
0.316500	49.80	29.6	60	10.0



Product Service

Frequency of emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

Remarks

The Emission of EUT is sufficient to keep it within limit at the measured frequencies.



Product Service

SECTION 4

TEST EQUIPMENT USED



Product Service

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Maximum Output Power and Outdoor Maximum Equivalent Isotropically Radiated Power (EIRP)					
Network Analyzer	Agilent	5230C	MY49002402	12	30-Mar-2018
Power Meter	Rohde & Schwarz	NRP2	101593	12	21-Mar-2018
Power Sensor	Rohde & Schwarz	NRP-Z11	121215	12	14-Apr-2018
Power Sensor	Rohde & Schwarz	NRP-Z11	121220	12	05-Apr-2018
Spectrum Analyser	KEYSIGHT	N9030A	MY54490502	12	05-Apr-2018
20dB Attenuator	Rosenberger	53AS102-K20	-	-	O/P MON
20dB Attenuator	Rosenberger	53AS102-K20	-	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	20-Dec-2017
Thermo-hygrometer	AZ Instruments	8705	9151665	12	02-Jan-2018
Occupied Bandwidth					
Network Analyzer	Agilent	5230C	MY49002402	12	30-Mar-2018
Power Meter	Rohde & Schwarz	NRP2	101593	12	21-Mar-2018
Power Sensor	Rohde & Schwarz	NRP-Z11	121215	12	14-Apr-2018
Power Sensor	Rohde & Schwarz	NRP-Z11	121220	12	05-Apr-2018
Spectrum Analyser	KEYSIGHT	N9030A	MY54490502	12	05-Apr-2018
20dB Attenuator	Rosenberger	53AS102-K20	-	-	O/P MON
20dB Attenuator	Rosenberger	53AS102-K20	-	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	20-Dec-2017
Thermo-hygrometer	AZ Instruments	8705	9151665	12	02-Jan-2018
Undesirable Emission - Conducted					
Network Analyzer	Agilent	5230C	MY49002402	12	30-Mar-2018
Power Meter	Rohde & Schwarz	NRP2	101593	12	21-Mar-2018
Power Sensor	Rohde & Schwarz	NRP-Z11	121215	12	14-Apr-2018
Power Sensor	Rohde & Schwarz	NRP-Z11	121220	12	05-Apr-2018
Spectrum Analyser	KEYSIGHT	N9030A	MY54490502	12	05-Apr-2018
20dB Attenuator	Rosenberger	53AS102-K20	-	-	O/P MON
20dB Attenuator	Rosenberger	53AS102-K20	-	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	20-Dec-2017
Thermo-hygrometer	AZ Instruments	8705	9151665	12	02-Jan-2018
Undesirable Emission - Bandedge					
Network Analyzer	Agilent	5230C	MY49002402	12	30-Mar-2018
Power Meter	Rohde & Schwarz	NRP2	101593	12	21-Mar-2018
Power Sensor	Rohde & Schwarz	NRP-Z11	121215	12	14-Apr-2018
Power Sensor	Rohde & Schwarz	NRP-Z11	121220	12	05-Apr-2018
Spectrum Analyser	KEYSIGHT	N9030A	MY54490502	12	05-Apr-2018
20dB Attenuator	Rosenberger	53AS102-K20	-	-	O/P MON
20dB Attenuator	Rosenberger	53AS102-K20	-	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	20-Dec-2017
Thermo-hygrometer	AZ Instruments	8705	9151665	12	02-Jan-2018



Product Service

Undesirable Emission - Radiated					
EMI Receiver	Rohde & Schwarz	ESI40	100015	12	19-Aug-2017
Ultra Log Test Antenna	Rohde & Schwarz	HL562	100167	12	19-Aug-2017
Double-Ridge Waveguide Horn Antenna	Rohde & Schwarz	HF 906	100030	12	19-Aug-2017
Pyramidal Horn Antenna	EMCO	3160-09	760840	-	19-Aug-2017
Pyramidal Horn Antenna	EMCO	3160-10	808234	-	19-Aug-2017
Semi Anechoic Chamber	Frankonia	23.18m×16.88m×9.60m	-	12	19-Aug-2017
Antenna Master	Frankonia	MA 260	-	12	19-Aug-2017
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002	-	TU
Load	Rosenberger	53K17R-005	-	-	O/P MON
Load	Rosenberger	53K17R-005	-	-	O/P MON
DC Power Supply	Keysight	N5767A	BAMS-1001607355	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	20-Dec-2017
Thermo-hygrometer	AZ Instruments	8705	9151665	12	02-Jan-2018
Frequency Stability					
Network Analyzer	Agilent	5230C	MY49002402	12	30-Mar-2018
Power Meter	Rohde & Schwarz	NRP2	101593	12	21-Mar-2018
Power Sensor	Rohde & Schwarz	NRP-Z11	121215	12	14-Apr-2018
Power Sensor	Rohde & Schwarz	NRP-Z11	121220	12	05-Apr-2018
Signal Analyzer	Rohde & Schwarz	FSQ	200960	12	14-Aug-2017
20dB Attenuator	Rosenberger	53AS102-K20	-	-	O/P MON
Load	Rosenberger	53K17R-005	-	-	O/P MON
DC Power Supply	KEYSIGHT	N5767A	US15C4120P	-	O/P MON
Climate Chamber	Votsch	C7-1000 Pro	BAMS-1001642377	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	20-Dec-2017
Thermo-hygrometer	AZ Instruments	8705	9151665	12	02-Jan-2018
Conducted Emission					
EMI Receiver	Rohde & Schwarz	ESI40	100015	12	19-Aug-2017
LISN	AFJ	LS16C	16011306281	12	19-Aug-2017
AMN	Rohde & Schwarz	ENV4200	100091	12	19-Aug-2017
Load	Rosenberger	53K17R-005	-	-	O/P MON
Load	Rosenberger	53K17R-005	-	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	20-Dec-2017
Thermo-hygrometer	AZ Instruments	8705	9151665	12	02-Jan-2018

N/A – Not Applicable

OP MON – Output Monitored with Calibrated Equipment



Product Service

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Discipline	Frequency / Parameter	MU
Conducted Maximum Peak Output Power	30MHz to 10GHz Amplitude	0.5dB*
Conducted Emissions	30MHz to 40GHz Amplitude	3.0dB*
Frequency stability	30MHz to 5GHz	$<\pm 1 \times 10^{-7}$
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions	150kHz to 30MHz	1.98dB
Worst case error for both Time and Frequency measurement 12 parts in 10^6		

* In accordance with CISPR 16-4



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

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